Sixty-Sixth Annual Report of the Visitors of the University Observatory for 1940

BOARD OF VISITORS, 1941.

THE VICE-CHANCELLOR (G. S. GORDON, M.A., President of Magdalen).
THE SENIOR PROCTOR (J. W. Gough, M.A., Fellow of Oriel).
THE JUNIOR PROCTOR (N. H. K. A. Coghill, M.A., Fellow of Exeter).
F. HOMES DUDDEN, D.D., Master of Pembroke (*Chairman*).
THE ASTRONOMER ROYAL (H. Spencer Jones, M.A., D.Sc., F.R.S.).
THE DIRECTOR OF THE CAMBRIDGE OBSERVATORY (Sir A. S. Eddington, O.M., Hon. D.Sc., F.R.S.).
THE RADCLIFFE OBSERVER (or a person deputed by the Radcliffe Trustees).

Sir J. S. E. TOWNSEND, M.A., F.R.S., Fellow of New College.
F. A. LINDEMANN, M.A., F.R.S., Fellow of Wadham and Student of Christ Church.
E. A. MILNE, M.A., F.R.S., Fellow of Wadham.
G. M. B. DOBSON, M.A., D.Sc., F.R.S., Fellow of Merton.
} Until Oct., 1945.

This report refers to the calendar year 1940.

I. Staff.

The continuation of the war has inevitably resulted in a diversion of the activities of the staff. Thus while Dr. Adam has continued as Acting Director, and has been able to do some research, a large proportion of her time has been given to demonstrating in the Electrical Laboratory. Since early in July Mr. Evans has been working at the Nuffield Department of Anaesthetics on the application of physical methods to medical problems, and this has left him with relatively little freedom for astronomical research. Mr. Hughes has continued to serve with a light A.A. battery, while the director has been transferred from a heavy A.A. battery to do research in connexion with aircraft production. Apart from these temporary changes, the staff remains as reported in previous years.

II. Instruction.

A course entitled 'Introductory Lectures in Astronomy for Mathematicians and Physicists' was given twice weekly by Mr. Evans to an audience of about 20 during the Michaelmas Term. He also supervised some graduate work in astrophysics undertaken by Mr. Hanson of Wadham. The usual colloquium was held as far as possible weekly during Term, while the observatory was open on Saturday evenings.

Dr. Adam successfully completed her work for the D.Phil. and was awarded the degree on 23 November.

III. Work.

Astrophysics. Dr. Adam's study of faint solar lines was completed during the year, and a paper on the subject was communicated to and published by the Royal Astronomical Society. The observed strengthening of these faint lines, discovered by her in 1937, is now shown to arise, not so much from interlocking, as first suggested, but from the existence of an isothermal region in the upper layers of the solar atmosphere. Work on an experimental determination of transition probabilities, using the Cd resonance line at λ 2288, has been initiated, and though under existing conditions this can only proceed slowly, it is hoped to build up a technique which will be generally applicable to lines of astrophysical interest.

The director completed the work on the numerical integration of the equation of transfer for absorption lines (see Reports for 1937–9), and a paper on the subject was communicated to the Royal Astronomical Society at its November meeting. In this paper the method is applied to the observed variation of the Mg b line, λ 5383, across the solar disk, and from this variation the observed change of the line absorption coefficient with optical depth in the solar atmosphere is derived. The ratio of line to continuous absorption coefficient (Eddington's η) is found to rise steeply from zero at the boundary, a consequence

presumably of the high excitation potential of the lower, metastable state of this line.

This same problem has also engaged the attention of Mr. Evans during the year, his interest having primarily been aroused by an attempt further to discuss his observations of the contour of Hα across the solar disk (see Report for 1939). His first method of attack, the analogue for absorption lines of that proposed by Milne for the continuous spectrum (Handb. d. Astroph., III/1, p. 132, 1930), proved impracticable, but as it was of some theoretical interest an account was communicated to the Royal Astronomical Society at its November meeting. Subsequently Mr. Evans developed a new method which involves expressing the observed darkening towards the limb by a Fourier sequence, and with the assistance of Mr. Hanson this is now being put to a practical test on the continuous spectrum. As a result of a colloquium by Mr. Evans on this problem, Dr. Busbridge has developed a third method of attack, applicable to the continuous spectrum, and has communicated an account of her work to the Royal Astronomical Society.

Astrographic Catalogue. All the work on the two Potsdam zones $+32°$ and $+33°$ has now been completed by Mr. H. Scott Barrett, and with the exception of the introduction the manuscript for both zones is now ready for press. Funds for printing, however, are not available, and publication must therefore await the end of the war, possibly longer.

Seismological Summary. Miss Bellamy has continued throughout the year her work on preparing and editing the copy for the *International Seismological Summary.* Apart from such assistance as Mr. Hughes could give, and some computational help from Mr. Cook, she has borne the whole brunt of preparing, editing, and distributing the first two quarters of the Summary for the year 1934.

Through the initiative of Brigadier H. St. J. L. Winterbotham, General Secretary of the Geodetic and Geophysical Union, the finances of the Summary have been put on a satisfactory footing

for the balance of the war. From this source the cost of printing and of computational assistance are assured, so that the Summaries should continue to appear, though necessarily at a greatly reduced rate.

IV. Publications.

The following papers have been published during the year:

M. G. Adam. 'Variation of Faint Fraunhofer Lines across the Solar Disc (Second Paper)', *Monthly Notices*, R.A.S., vol. 100, p. 595.

E. F. Bellamy. *The International Seismological Summary*, Parts 1, 2, 1934. (County Press.)

D. S. Evans. 'Photometric Observations of Hα in the Solar Spectrum', *Monthly Notices*, R.A.S., vol. 100, p. 156.

The first and last of these papers in their reprint form appeared as Communications from the University Observatory, Nos. 17 and 18.

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